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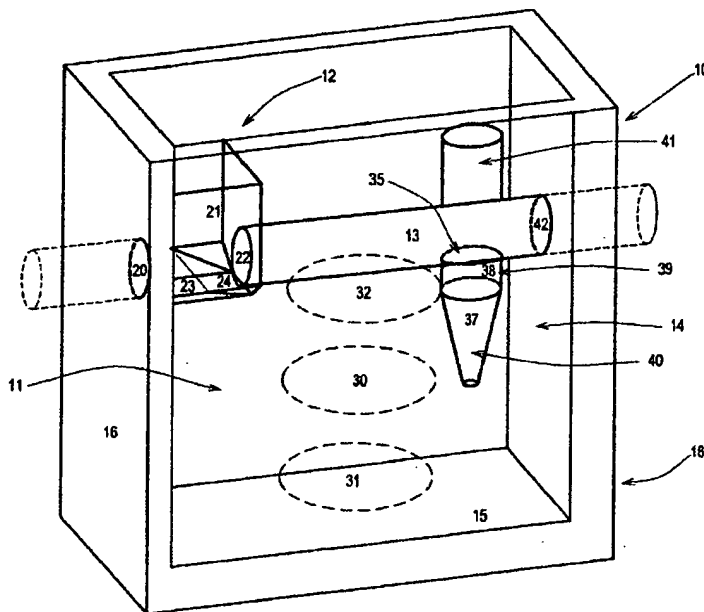
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- (71) Applicants (*for all designated States except US*): **CENTRAL MORETON INDUSTRIES PTY LTD [AU/AU]**; 8 Hiley Street, Slacks Creek, Queensland 4127 (AU). **D H ENVIRONMENTAL PTY LTD [AU/AU]**; 1 Lewis Street, Clayfield, Queensland 4011 (AU).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): **ANDERSON, Gary, Maurice [AU/AU]**; 1 Lewis Street, Clayfield, Queensland 4011 (AU).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **A FILTER ASSEMBLY**



(57) Abstract: A filter assembly (10) for installation in a chamber (11) including: a flow guide (12) extendable across the chamber (11) providing a path between a chamber inlet (20) and a chamber outlet (42); a diversion means (24) associated with the flow guide (12), said diversion means (24) adapted to divert water from the flow guide (12); and a return inlet (14) associated with the flow guide (12) and adapted to return treated water to the flow guide (12) or to allow treated water to pass through to the chamber outlet (42) wherein the return inlet (14) is located downstream of said diversion means (24).

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## A FILTER ASSEMBLY

### FIELD OF THE INVENTION

5           This invention relates to filter assemblies for drains such as stormwater drains for filtering runoff water prior to discharge. The invention has particular but not exclusive application as an in-line process filter for the filtering of stormwater, waste water and runoff water. By way of example only, the present invention will be described hereinafter with reference to stormwater drains and drainage.

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### PRIOR ART

          Stormwater drains often discharge directly into waterways and carry large amounts of debris and pollutants into the waterways. In recent years there has been a growing awareness of the need to minimise pollution resulting from surface water runoff.

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          The filtering of surface water runoff is a complex problem. One of the difficulties associated with filtering surface water runoff is that the pollutants can vary from being relatively large objects such as aluminium drink cans to sediment and organic debris to chemical pollutants such as oils and greases. A further problem associated with filtering surface water runoff is that the runoff may vary between a trickle and a full flow. A filtering apparatus must be capable of handling the full range of flows to work efficiently.

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### OBJECT OF THE INVENTION

It is an object of the present invention to provide a filtering assembly that alleviates at least one of the aforementioned problems associated with the filtering of surface water runoff.

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### SUMMARY OF THE INVENTION

The invention in one aspect broadly resides in a filter assembly including:

a flow guide extendable across a chamber providing a path between a chamber inlet and a chamber outlet;

10 a diversion means associated with the flow guide, said diversion means adapted to divert water from the flow guide; and

a return inlet associated with the flow guide and adapted to return treated water to the flow guide or allow treated water to pass through to the chamber outlet wherein said return inlet is located downstream of said diversion means.

15 In a preferred form, the filter assembly is fitted and installed in the chamber. The chamber may be prefabricated, formed in situ or a pre-existing stormwater chamber.

The flow guide may be a substantially continuous or discontinuous path between the chamber inlet and the chamber outlet. In one form the flow guide is a  
20 discontinuous path adapted to direct the flow of water to the chamber outlet. In a preferred alternative form the flow guide is a substantially continuous path except for diversion means and return inlets located in the flow guide. Where the flow guide is substantially continuous as described above, the flow guide may be an open or substantially enclosed conduit.

In one preferred form the flow guide is an enclosed conduit except for apertures associated with the diversion means and the return inlet. The substantially enclosed conduit prevents mixing of treated water with untreated water except where treated water is introduced into the flow guide at the return inlet. The phrase "treated  
5 water" includes water in the chamber where the debris, sediment and other pollutants in the water have settled or floated to the surface. In a preferred embodiment of this form the flow guide is a substantially enclosed cylindrical pipe. The cylindrical pipe is preferably at least 0.9 times the internal diameter of the chamber inlet.

10 In another preferred form the flow guide is an open conduit serving to direct water rather than hold water. The flow guide may be any suitable shape such as a guide with a semicircular cross section. In one embodiment the flow guide may have a substantially flat suspended floor with a raised portion forming a weir member.

The flow guide is preferably downwardly inclined from the chamber inlet to the  
15 chamber outlet when installed. The flow guide is preferably downwardly inclined at a slight angle to minimise potential hydraulic head loss between the chamber inlet and the chamber outlet. In one embodiment the invert (bottom) of the chamber outlet is preferably between 0.005 and 0.015 times the length of the chamber lower than the invert of the chamber inlet.

20 When installed the diversion means is preferably in the flow guide and located near or adjacent the chamber inlet. The diversion means preferably includes an aperture for diverting water into a treatment portion of the chamber. The treatment portion of the chamber is that portion below the diversion aperture and return inlet aperture. The diversion means preferably also includes a wall, weir or the like  
25 preventing a flow or part thereof from passing further along the flow guide.

In a preferred form the diversion means includes a diversion aperture with a forwardly inclined weir member extending forwardly and upwardly from the downstream side of the diversion aperture. The position of the weir member preferably provides diversion of a shallow flow into the chamber and diversion of part  
5 of a full flow into the chamber. The height and shape of the weir member is such that it preferably creates minimal turbulence in the downstream side of the flow guide. The weir member preferably extends to a height that substantially avoids the flow guide from being blocked by debris and litter. The angle of the weir member is preferably shallow (that is an acute angle) to direct water in a shallow flow and water  
10 in part of a full flow downwards into the chamber. Where the flow guide is an enclosed pipe, the inclined weir member is preferably wider than the flow guide to minimise head loss in full flow conditions.

The diversion means preferably includes sidewalls that substantially prevents water discharge from the chamber inlet escaping from the diversion means. The  
15 diversion means preferably also includes side chutes. In a preferred form there are chutes angled downwardly on either side of the aperture and extend from the sidewalls. The chutes preferably extend below the flow guide to prevent debris and pollutants such as oil and other hydrocarbons from re-entering the flow guide.

Where the chamber inlet has a circular cross section, the diversion means is  
20 preferably a flow control unit having an overall length between 1.5 to 4 times the internal diameter of the chamber inlet. The width of the unit is preferably between 1.5 and 3.5 times the internal diameter of the chamber inlet and the height of the sidewalls are greater than 0.9 times the internal diameter of the chamber unit above the side chutes. The height of the inclined weir member is preferably between 0.2  
25 and 1.0 times the internal diameter of the chamber inlet above the invert (bottom) of

the chamber inlet. The length of the inclined weir member is preferably between 0.5 and 2.0 times the internal diameter of the chamber inlet. The width of the inclined weir member is preferably determined by the overall width of the flow control unit and the side chutes. The height of the side chutes is preferably between 0.25 and 1.0 times the internal diameter of the chamber inlet and do not protrude beneath the bottom of the invert of the chamber inlet by greater than 100mm. The width of the opening between the side chutes is preferably between 0.75 and 2.0 times the internal diameter of the chamber inlet.

The return inlet is preferably an aperture in the flow guide downstream of the diversion aperture. The return inlet may alternatively be a gap between the discontinuous flow guide and the chamber outlet. The return inlet allows water in the treated portion of the chamber to return to the flow guide to be discharged from the chamber outlet or simply discharged from the chamber guide.

The return inlet in one alternate form does not have a screen. In a preferred form the return inlet includes a screen to prevent debris from passing through the inlet aperture. The screen may be a vertical, horizontal or inclined screen. Preferably the screen is a tapered inclined filter screen. The tapering of the filter screen extends from the aperture of the return inlet to within the chamber. Preferably the filter screen is in the shape of an inverted cone or pyramid. With the tapering of the filter screen the inlet area is maximised whilst having a self cleaning operation allowing debris and litter to fall from the screen as the water level rises and falls.

In a preferred form the return inlet includes an inverted conical screen mounted about an inlet aperture in the flow guide. The height of the inverted conical screen is preferably between 0.7 and 3.0 times the internal diameter of the chamber

inlet. The base diameter of the inverted conical screen is preferably between 0.7 and 1.5 times the internal diameter of the chamber inlet and fits tightly over the inlet aperture. The diameter of the truncation of the inverted conical screen is preferably between 20mm and 100mm. Preferably the area of the inverted conical screen is greater than twice the area of the chamber inlet.

In one preferred embodiment there is an inspection port which allows the screen to be inspected and serviced. In one preferred embodiment the internal diameter of the return inlet is between 0.6 and 1.1 times the internal diameter of the chamber inlet.

10 In one preferred embodiment the horizontal distance from the closest edge of the return inlet to the chamber outlet is preferably between 60mm and 250mm.

In another aspect the invention broadly resides in a filter assembly including:  
a chamber;

a flow guide extending across the chamber and providing a path between a  
15 chamber inlet and a chamber outlet;

a diversion means associated with the flow guide, said diversion means being able to divert flow from the flow guide to the chamber; and

a return inlet associated with the flow guide adapted to return treated water to the flow guide wherein said return inlet is downstream from said diversion means.

20 The filter assembly preferably serves as a unit for installation in a stormwater drainage system. The chamber serves as an integral part of the filter assembly providing housing for the flow guide diversion means and return inlet. The chamber preferably allows various types of pollutants and debris to settle or separate from the water (that is, come out of suspension) and rise to the surface. The chamber  
25 preferably provides storage of collected pollutants.

The chamber may be a prefabricated chamber. For smaller chambers the chamber may be a modular precast concrete chamber. With larger chambers, the chamber may be made in parts and assembled on site or at the factory. Each chamber preferably has one or more access openings for inspection, cleaning out of  
5 pollutants and debris and for general maintenance.

The chamber may have an opening in the roof of the chamber for surface run off water to pass through and into the chamber. The opening in the chamber roof may be the only entrance for water into the chamber or be a further site of entry in association with one or more inlet pipes. The opening in the roof of the chamber is  
10 preferably above the diversion means. Preferably there are one or more deflector members between the roof opening and the diversion means for directing the water into the treatment portion of the chamber and substantially avoid passing along the flow guide. When the flow entering the chamber through the roof opening and or inlet pipe is such that water accumulates in the treatment portion of the chamber and  
15 begins to overflow, the flow guide preferably serves as a bypass for the accumulated and or incoming water. The roof opening is preferably covered by a removable or hinged grate. The roof opening is preferably at the same level as the surrounding ground. The roof opening may be at the pavement, roadway, or gutter level. The passage from the roof opening preferably directs surface water into the treatment  
20 portion of the chamber forcing treated water out through the return inlet.

The chamber may have one or more inlets that open adjacent the diversion means. In one form there maybe one or more chamber inlets on adjacent walls. One or more deflector members are preferably suitably positioned to form weir members.



The chamber may have the chamber outlet on a wall not in a direct line with the chamber inlet. In one embodiment the chamber outlet is in a sidewall and adjacent the chamber rear wall.

The description of the flow guide, diversion means and return inlet that is  
5 described above in the different variations and embodiments also applies to this aspect of the invention.

The length of the chamber is preferably between 3 and 10 times the internal diameter of the chamber inlet. The embodiment also has a length of at least 1.5 times greater than the width of the chamber.

10 The depth of the chamber below the chamber inlet preferably provides for a floatable storage zone, a treatment zone and solids storage zone. The treatment zone is the region where water enters the chamber from the diversion means. The treatment zone is of sufficient depth to reduce the velocity of the flow entering from the diversion means. The depth and length of the treatment zone is  
15 dependent on the angle of the weir member which directs water into the chamber. Preferably the angle of the inclined weir member is shallow. It is preferable that the diversion aperture be sufficiently spaced from the inlet aperture to avoid the incoming flow from immediately escaping through the return inlet aperture.

The floatable storage zone is that region in the chamber adjacent the flow  
20 guide and above the treatment zone. In the floatable storage zone, pollutants such as oils, hydrocarbons and gross litter which float on water are kept from entering the flow guide at the return inlet.

The solids storage zone is substantially at the bottom region of the chamber. Preferably the solid storage zone is large enough to contain a variety of debris such  
25 as cans, leaf litter, aggregates and silt.

In another aspect the invention is a method of treating water including:  
providing a filter assembly as described above to receive flows through a common inlet;  
diverting water from a flow into a chamber allowing water from an excess flow  
5 to pass along a flow guide and through a chamber outlet;  
treating water in the chamber;  
discharging treated water from the chamber through a return inlet along the flow guide and through the chamber outlet.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

In order that this invention be more readily understood, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the invention and wherein:

Fig. 1 is a diagrammatic view of the filter assembly;

15

Fig. 2 is a plan view of the filter assembly;

Fig. 3 is a side view of the filter assembly;

Fig. 4 is an end view of the chamber inlet of the filter assembly;

Fig. 5 is a plan view of the flow control unit;

Fig. 6 is a section view (section A-A) of the flow control unit;

20

Fig. 7 is a perspective view of the flow control unit;

Fig. 8 is a section view (section B-B) of the flow control unit;

Fig. 9 is a diagrammatic view of another embodiment of the inverted conical screen;

Fig. 10 is a photograph of the flow control unit; and

25

Fig. 11 – 13 are alternative embodiments of the invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to Figure 1 there is shown a filter assembly 10, including chamber 11, a flow guide in the form of a flow control unit 12 and an enclosed pipe 13, and a return inlet 14 located below in the enclosed pipe 13 and in communication with the enclosed pipe 13. The chamber 11 has a floor 15, sidewalls 16 and top wall 17 (shown in Figures 3 and 4). The top wall 17 has one or more access openings (not shown) to provide access to the interior of the chamber 11.

The flow control unit 12 as shown in Figures 1 to 8 and 10 is located adjacent to the chamber inlet 20 and pipe inlet 22. Flow control unit 12 has sidewalls 21 which restricts the passage of water discharged from chamber inlet 20 to pass through either pipe inlet 22 or diversion aperture 23. The water discharged from chamber inlet 20 is subject to diversion by weir 24. Weir 24 extends upwardly and forwardly at an inclined angle from a rear edge of the diversion aperture 23. The weir 24 serves to divert water discharged from chamber inlet 20 into the interior of chamber 11 or pass along pipe 13. In the case of a shallow flow where the flow of water does not exceed the height of the weir 24, the water is diverted into the interior of chamber 11. In the case of full flows, water from part of the flow is diverted by the weir 24 into the interior of the chamber 11. The greater the height of the weir 24, the greater is the amount of water diverted into the interior of chamber 11. Weir 24 is attached to chutes 25 which extend downwardly from the sidewalls 21. The chutes 25 extend below the lower level of the pipe 13.

The weir 24 is attached at its side edges to the chutes 25 to create a valley 26 which directs water flowing over the weir 24 towards pipe inlet 22. Adjacent the weir 24 is an intermediate member 27 which serves to pass water to the pipe inlet 22.

Water passing through the chamber inlet 20 may be diverted into the chamber 11 through diversion aperture 23. The diverted water enters the chamber 11 to the treatment zone 30. At the treatment zone 30 debris such as sediment and other non-floating litter sink towards the chamber floor 15 and form the solids storage zone 31. Pollutants such as oil and hydrocarbons and other floatable debris rise towards the water level surface to form the floatable storage zone 32. The pollutants and other floatable debris are substantially prevented from entering the diversion aperture 23 by the chutes 25 and weir 24 which extend below the bottom level of pipe 13.

10 The return inlet 14 includes an inlet aperture 35 in the pipe 13 and downstream of the diversion aperture 23. The inlet aperture 35 is surrounded by an inverted conical screen 36 (shown also in another embodiment in Fig. 9 where there is conical portion 37a and mesh wall 40a). The inverted conical screen 36 has a conical portion 37 and cylindrical portion 38. The cylindrical portion 38 is mounted  
15 about inlet aperture 35 and extends downwardly from the inlet aperture 35. The cylindrical portion 38 has an enclosed outer wall 39 which prevents pollutants and floatable debris from passing therethrough. The conical portion has a mesh 40 which allows water but not debris larger than the pore size of the mesh to pass through the mesh wall 36 and subsequently to inlet aperture 35. The inverted  
20 conical shape of screen 36 provides an increased surface area through which water may pass. The inverted conical shape of screen 36 also facilitates the removal of debris and litter from the mesh screen as the flow in the chamber changes in velocity. Because the pipe 13 is downwardly inclined to facilitate the passage of water along pipe 13, the inlet aperture 35 is lower than the diversion aperture 23.

Consequently, water in the chamber 11 will preferentially be discharged through inlet 35.

There is also an inspection port 41 mounted on an upper side of pipe 13 to provide inspection of the inverted conical screen 36.

5 Water passing through the conical portion 37 and inlet aperture 35 passes along pipe 13 towards chamber outlet 42. The water is subsequently discharged from the filter assembly 10 through chamber outlet 42.

In the case of flows that do not pass over the weir 24 the water is directed into the chamber 11 where it is treated. The in-flowing water displaces the previously  
10 treated water via a head differential between the weir 24 and the inlet aperture 35.

When there is a full flow part of the water is diverted into the chamber 11 while the water flowing over the weir 24 enters pipe inlet 22 and passes along pipe 13 for discharge from the filter assembly 10.

In figures 11, 12 and 13 there are shown alternative embodiments of the filter  
15 assembly. In figure 11 there is shown a chamber 51 with a flow guide 52 suspended within the chamber 51 and between the chamber inlet 53 and chamber outlet 54. The flow guide 52 has an inclined portion 55 that forms a weir. An alternate inclined portion 56 is shown in phantom. The alternate inclined portion 56 has a steeply inclined end section 57 that substantially forms the weir. Located within the guide  
20 flow 52 is a return inlet 58 which includes a downwardly extending cylindrical portion 59 with an opening 60. In a further alternative embodiment there may be an inverted conical screen extending downwards from the end of the cylindrical portion 59. In use water entering the chamber 51 is diverted by the weir 55 (57) into the treatment portion 61 of the chamber 51. Treated water flows through the opening 60,  
25 cylindrical portion 59 and out through the chamber outlet 54. The flow guide 52 in

association with the return inlet 58 captures floatable pollutants in the defined space 62.

With reference to figure 12 there is shown a chamber 70 having a chamber inlet 71 and a chamber outlet 72. Within the chamber 70 there is a suspended flow guide 73. The flow guide 73 has an inclined portion 74 with an end that forms a weir. 5 The inclined portion 74 may have an alternative shape where the end section 75 is steeply inclined to form a weir. The return inlet 76 may simply be the gap provided between the flow guide 73 and the rear wall 77 of the chamber 70. The return inlet 76 may include a substantially vertical screen 78 extending between the end of the 10 flow guide 73 and the base wall 79 of the chamber 70. The vertical screen 78 may extend partly or completely to the base wall 79. In an alternative embodiment the return inlet may not have a vertically extending screen.

With reference to figure 13 there is shown a chamber 80 which has a chamber inlet 81 and a chamber outlet 82. In this embodiment the flow guide is a 15 divided section 83 with an intermediate wall 84 and a base wall 85. There is a weir 86 that extends from the intermediate wall 84. The intermediate wall 84 also has an aperture (not shown) to allow overflow water to enter the divided section 83. The base wall 85 has a return inlet 87 where treated water may pass through and enter the divided section 83. The return inlet 87 includes an aperture (not shown) in the 20 base wall 85, a cylindrical portion 88 extending downwardly from the aperture in the base wall 85 and an inverted conical screen 89 extending downwardly from the end of the cylindrical portion 88. There is also shown a deflector 90 extending from the intermediate wall 84 for deflecting water away from the aperture in intermediate wall 84. The deflector 90 deflects water entering the chamber 80 from an opening in the

chamber roof. Figure 13 also shows in phantom alternate chamber inlet 91 and alternate chamber outlet 92 in the sidewall 93 of the chamber 80.

One of the advantages of the filter assembly of the preferred embodiment is that it can handle both shallow and full flows. Another advantage of one or more of the preferred embodiments is the removal of pollutants such as oils, greases, and hydrocarbons, sediment and aggregates, litter such as plastics, paper, cans, bottles and cigarette butts, and or organic matter such as leaf litter and grass clippings. The filter assembly of the preferred embodiment also provides minimal hydraulic head loss between the chamber inlet and chamber outlet. The filter assembly of the preferred embodiment is relatively simple in construction and requires minimum excavation for installation. As well the collected pollutants and debris can be removed from the filter assembly of the preferred embodiment through an access opening. The access opening can also allow general maintenance of the filter assembly.

It will of course be realised that while the foregoing has been given by way of example, all such and other modifications and variations thereto as would be apparent to a person skilled in the art deemed to fall within broad scope and ambit of this invention as herein set forth.

## CLAIMS

1. A filter assembly for installation in a chamber including:

a flow guide extendable across the chamber providing a path between a  
5 chamber inlet and a chamber outlet;

a diversion means associated with the flow guide, said diversion means  
adapted to divert water from the flow guide; and

a return inlet associated with the flow guide and adapted to return treated  
water to the flow guide or allow treated water to pass through to the chamber  
10 outlet wherein said return inlet is located downstream of said diversion  
means.

2. A filter assembly as claimed in claim 1 wherein the diversion means includes  
an aperture associated with the flow guide and a weir member adapted to  
15 divert a flow through the aperture.

3. A filter assembly as claimed in claim 2 wherein the weir member extends  
forwardly and upwardly from the downstream side of the diversion aperture.

20 4. A filter assembly as claimed in claim 3 wherein the return inlet includes an  
inlet aperture located downstream of the diversion aperture.

5. A filter assembly as claimed in claim 4 wherein the return inlet also includes  
an inverted conical screen extending downwards from the inlet aperture.



6. A filter assembly including:

a chamber;

a flow guide extending across the chamber and providing a path between a chamber inlet and a chamber outlet;

5 a diversion means associated with the flow guide, said diversion means being able to divert flow from the flow guide to the chamber; and

a return inlet associated with the flow guide adapted to return treated water to the flow guide wherein said return inlet is downstream from said diversion means.

10 7. A filter assembly as claimed in claim 6 wherein the diversion means includes an aperture associated with the flow guide and a weir member adapted to divert a flow through the aperture, said weir member extends forwardly and upwardly from the downstream side of the diversion aperture.

15 8. A filter assembly as claimed in claim 7 wherein the return inlet includes an inlet aperture located downstream of the diversion aperture and an inverted conical screen extending downwards from the inlet aperture.

20 9. A filter assembly as claimed in any one of claims 6, 7 and 8 wherein the chamber has an opening in the chamber roof substantially above the diversion means for the passage of surface run off water into the chamber.

25 10. A filter assembly as claimed in claim 9 wherein there are one or more deflector members for directing surface run off water into a treatment portion of the chamber.

11. A filter assembly as claimed in any one of claims 6, 7 and 8 wherein there are two or more chamber inlets that are on adjacent chamber walls and adjacent the diversion means.

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12. A filter assembly as claimed in claim 11 wherein there is a deflector forming a weir member suitably positioned relative to the chamber inlet and the flow guide.

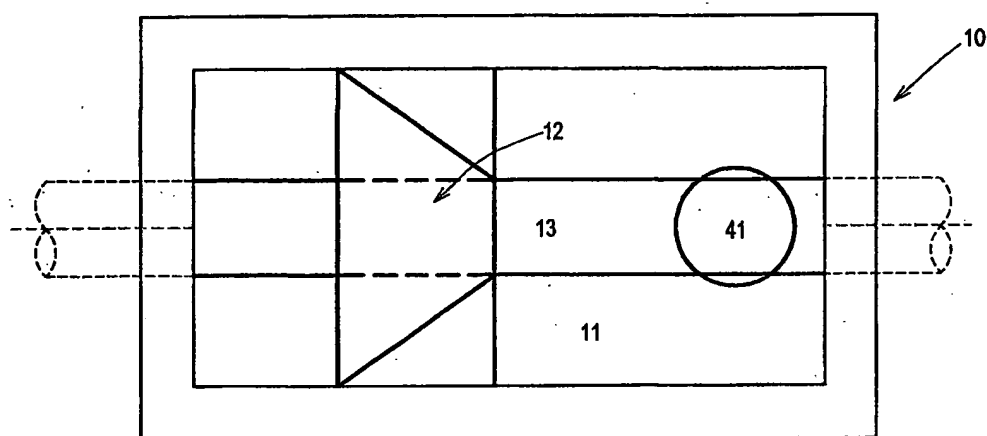
- 10 13. A filter assembly as substantially described herein with reference to and as illustrated by the accompanying drawings.

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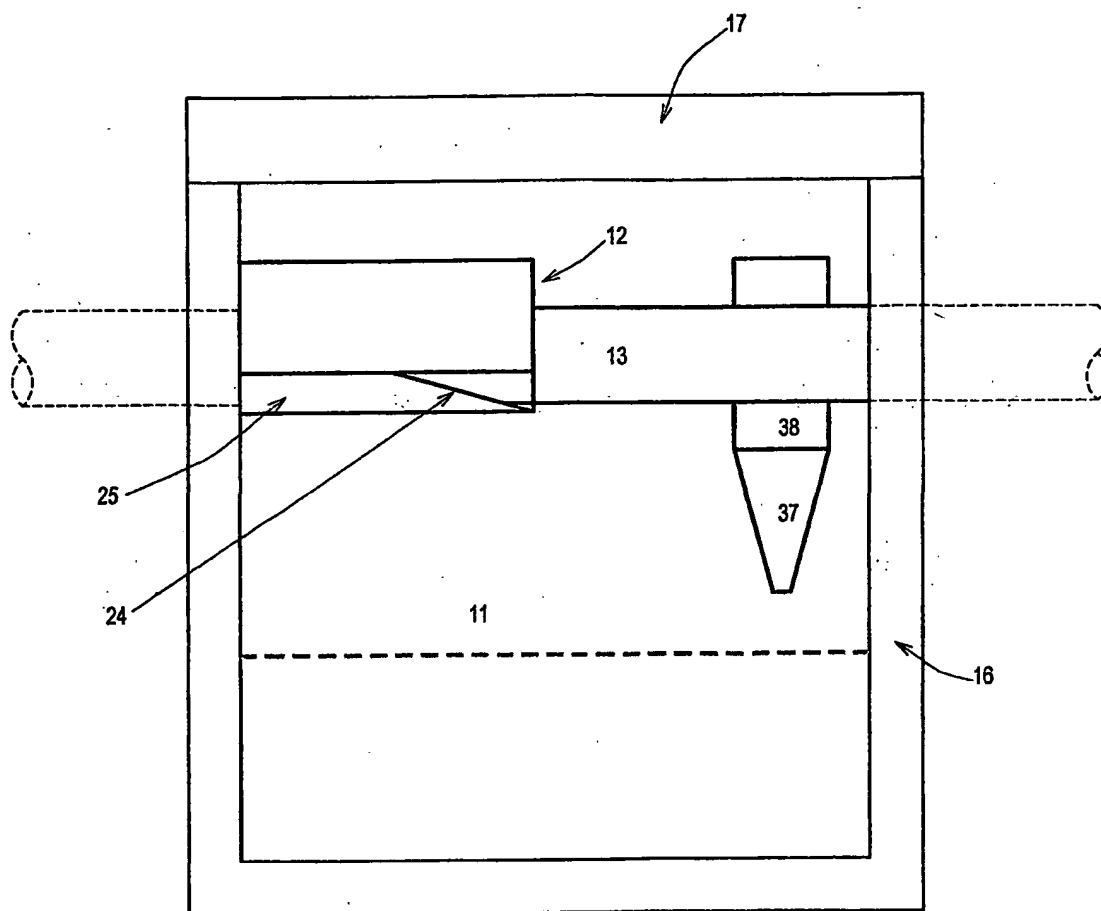
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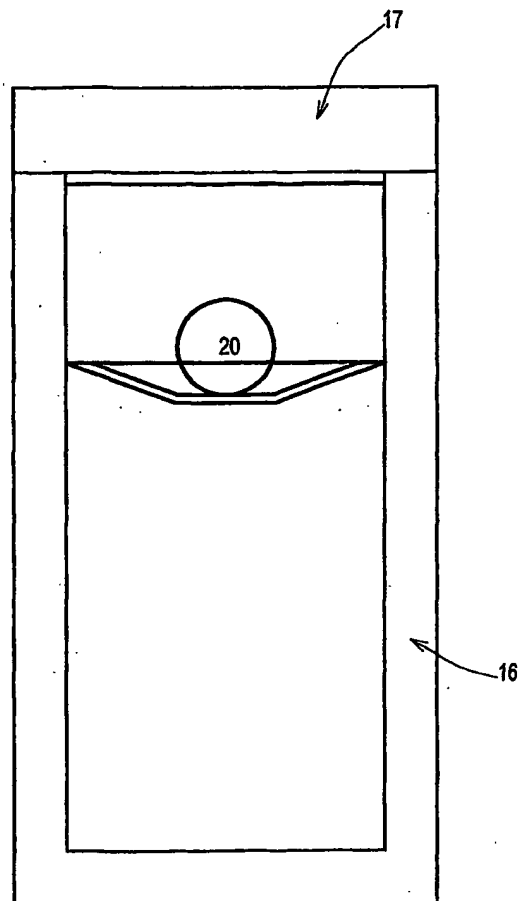
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**Figure 2**

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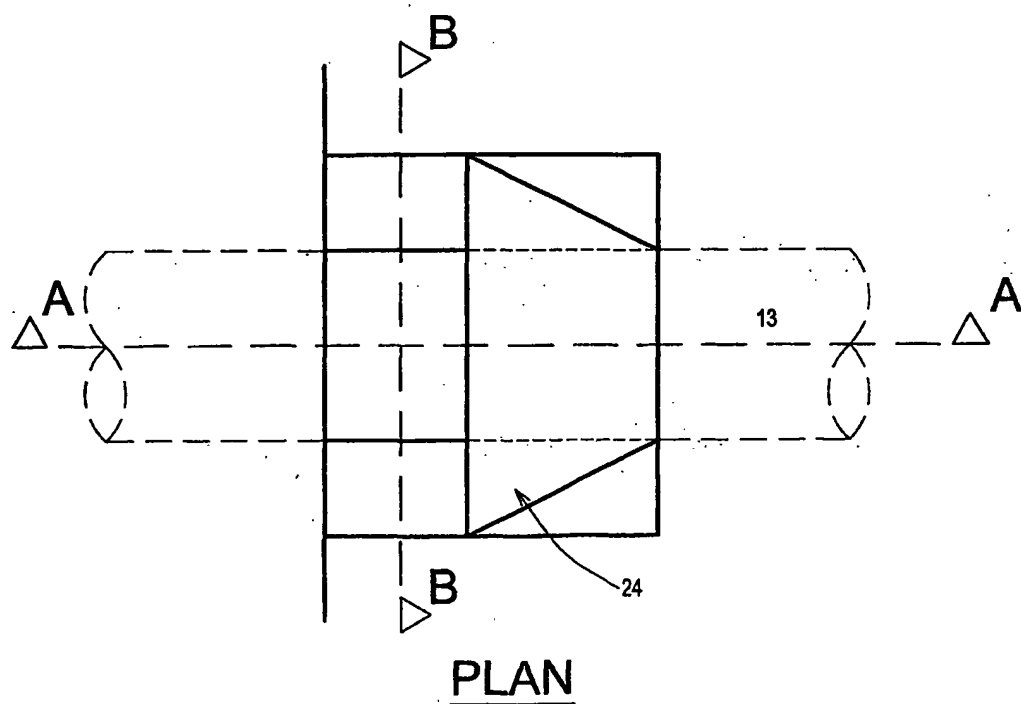
**Figure 3**

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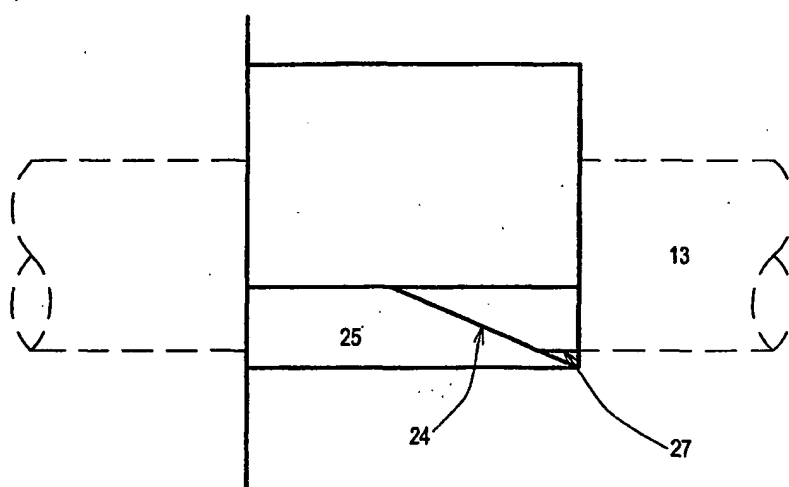
**Figure 4**

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**Figure 5**

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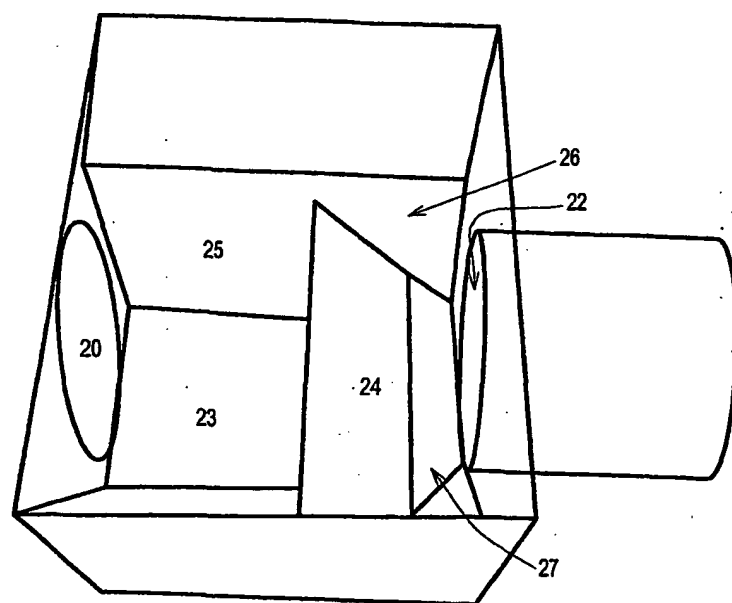


SECTION A-A

**Figure 6**



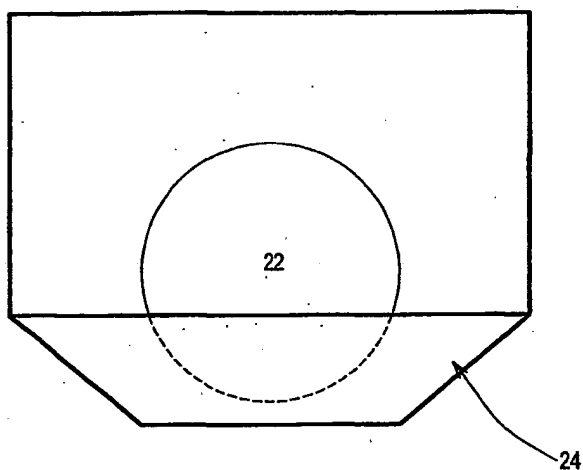
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PERSPECTIVE

**Figure 7**

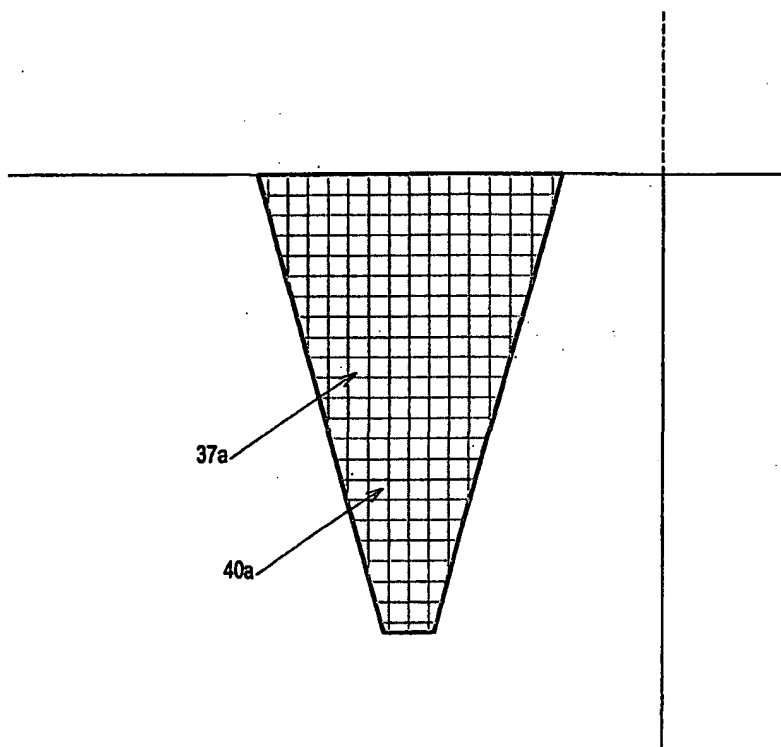
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SECTION B-B

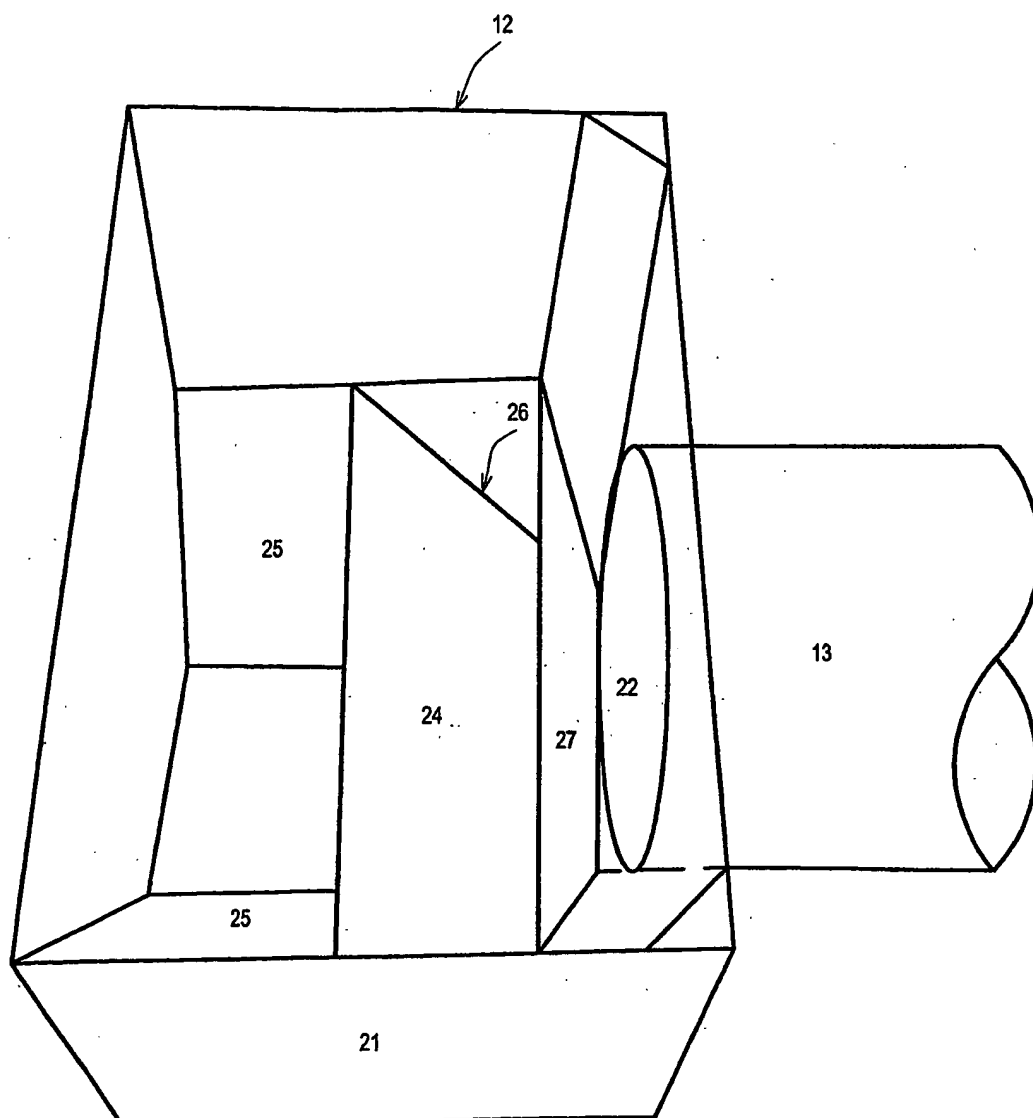
**Figure 8**

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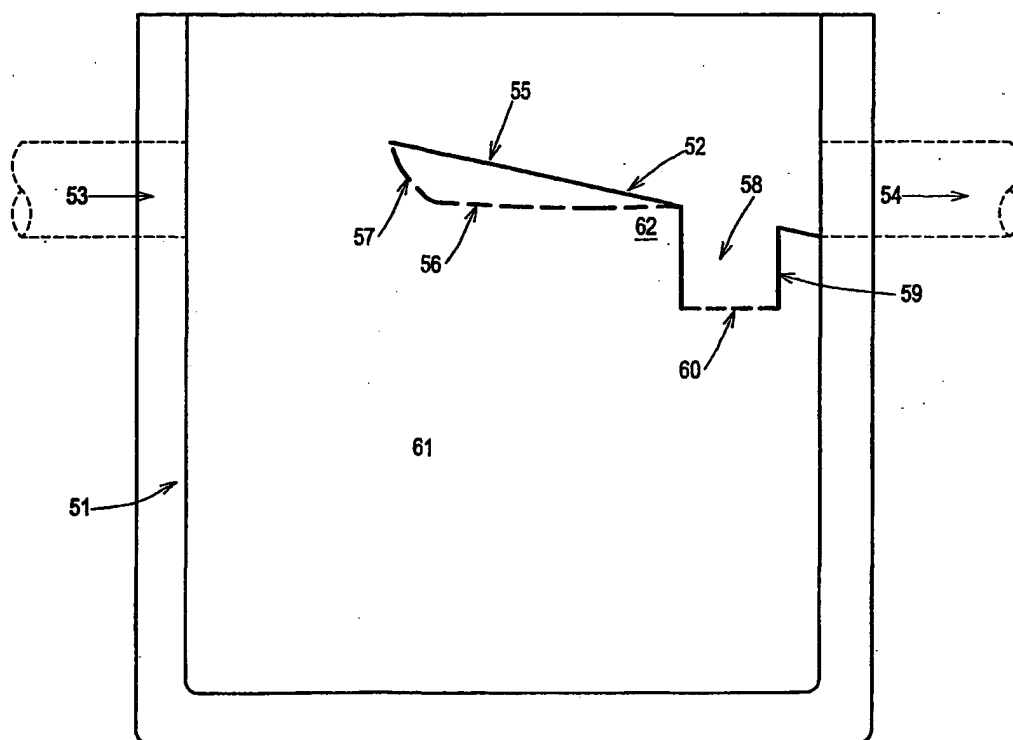
**Figure 9**

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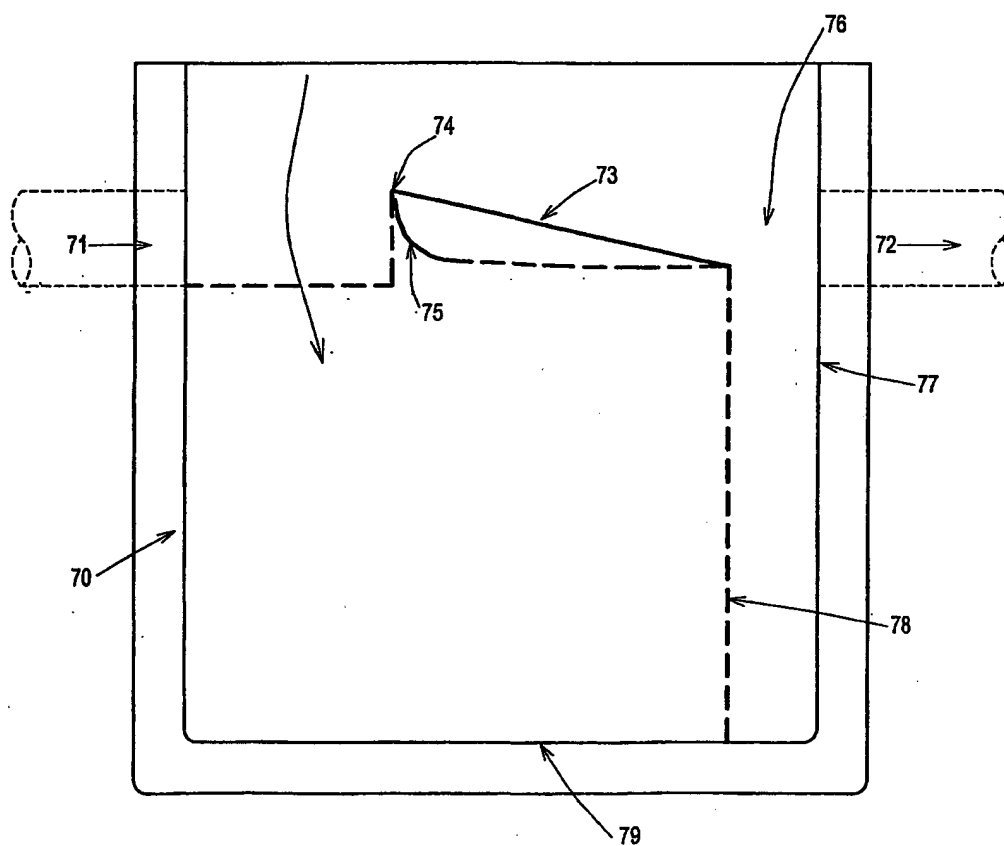


**Figure 10**

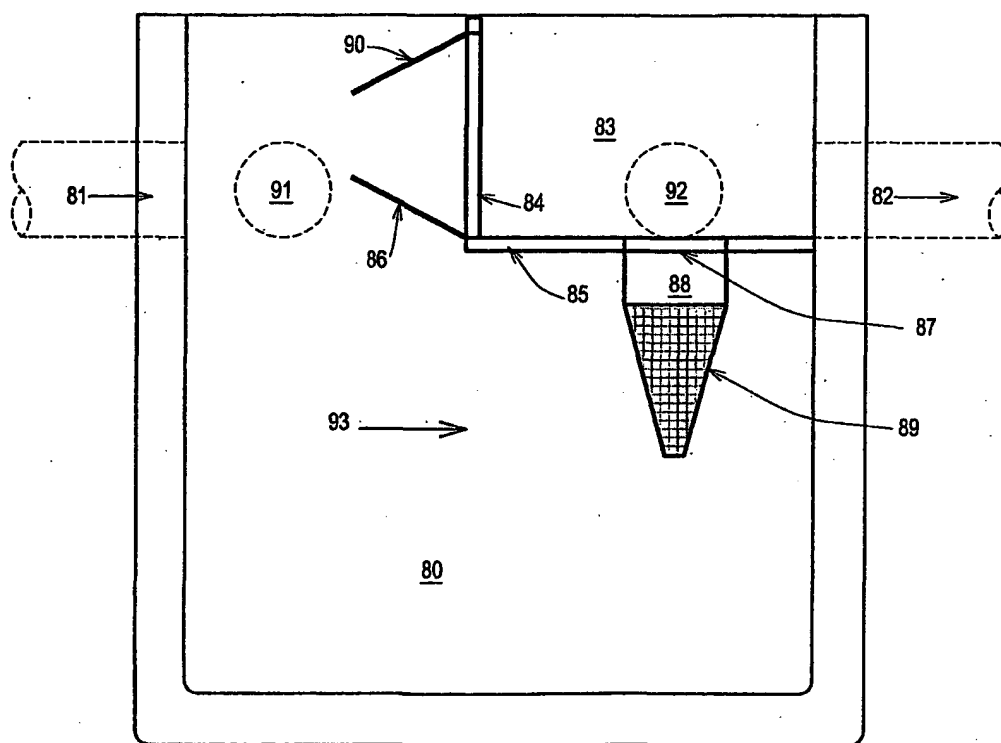
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**Figure 11**

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**Figure 12**

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**Figure 13**

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 01/00816

**A. CLASSIFICATION OF SUBJECT MATTER**Int Cl<sup>7</sup>: E03F 5/14

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC: E03F 5/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPAT: IPC E03F 5/14

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 89306/98 A (Swinburne) 6 May 1999 see whole document	1, 2, 6
X	WO 9817875 A (Ecosol) 30 April 1998 see whole document	1, 2, 6
X	WO 9741316 A (Stormceptor) 6 November 1997 see whole document	1, 2, 6

☒ Further documents are listed in the continuation of Box C☒ See patent family annex

\* Special categories of cited documents:

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Date of the actual completion of the international search

16 August 2001

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Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE  
PO BOX 200  
WODEN ACT 2606 AUSTRALIA  
E-mail address: pct@ipaustalia.gov.au  
Facsimile No.: (02) 6285 3929

Authorized officer

**B.R. DASHWOOD**  
Telephone No.: (02) 6283 2121



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 01/00816

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2306343 A (Johannessen) 7 May 1997 see whole document	1, 2, 6
X	WO 9954564 A (Ecosol) 28 October 1999 see whole document	1, 6, 9
A	AU 64385/96 (724337) B (C-M Concrete) 6 March 1997	
A	WO 9945214 A (C-M Concrete) 10 September 1999	

### Information on patent family members

**PCT/AU 01/00816**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
AU	89306/98	NONE					
WO	9817875	AU	46109/97	EP	935699	NZ	335378
		US	6086756				
WO	9741316	AU	52026/96	AU	23769/97	CA	2175277
		CN	1168439	JP	10037296	NZ	314646
		US	5725760				
GB	2306343	DE	19635176	FR	2740157		
WO	9954564	AU	33233/99				
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